

REMARKS/ARGUMENTS

Claims 2-8, 10-11, 13-22, and 62-74 remain pending. No claims are amended or canceled by this response.

Low k dielectric materials employed in the fabrication of semiconductor devices may comprise a mesoporous oxide layer protected by an overlying capping layer. Conventionally, the mesoporous oxide and capping layers have been formed using different tools. However, transfer of the wafer bearing the uncapped mesoporous oxide film between tools can result in water or other contamination being incorporated within the film.

Accordingly, embodiments of systems in accordance with the present invention comprise a single cluster tool having distinct modules for forming the low k dielectric and the capping layers. Specifically, a first, staged, high pressure module may be employed to perform successive deposition and stripping processes to form the mesoporous material. The workpiece may then be transferred through an interface to a second, low pressure module for forming the capping layer.

In order to minimize contamination between stripping and cap formation steps, embodiments in accordance with the present invention position the stripping chamber in the first, staged atmosphere system including deposition chambers operating at or near atmospheric pressure, and evacuable substrate stripping chambers operating at low pressures.

Pending independent claims 64 and 66 recite embodiments where a stripping chamber is located in the first module:

64. An apparatus for processing substrates, the apparatus comprising:

a staged high pressure processing module including a first plurality substrate processing chambers, a first transfer chamber that enables access to each of the first plurality of substrate processing chambers, and a first substrate handling member disposed in the first transfer chamber and configured to transfer substrates into and out of any of said first plurality of substrate processing chambers; wherein each of the first plurality of substrate processing chambers is dedicated to perform at least one step associated with the formation of a porous dielectric film from a liquid precursor including at least one liquid precursor deposition chamber, and one or more substrate stripping chambers, the one or more stripping chambers in communication with a vacuum system and configured to be evacuated to near vacuum conditions . . .

66. An apparatus for processing substrates, the apparatus comprising:

a staged high pressure processing module including a first plurality of substrate processing chambers, a first transfer chamber that enables access to each of the first plurality of substrate processing chambers, and a first substrate handling member disposed in the first transfer chamber and configured to transfer substrates into and out of any of said first plurality of substrate processing chambers, said first plurality of substrate processing chambers including one or more substrate stripping chambers, the one or more stripping chambers in communication with a vacuum system and configured to be evacuated to near vacuum conditions . . .

In a previous office action, the Examiner rejected the claims as obvious under 35 U.S.C. 103(a) in light of U.S. patent no. 5,769,952 to Komino ("the Komino patent"), in combination with a number of other references. In response, Applicants emphasized the Komino patent failed to teach, or even suggest, a tool for forming mesoporous films which featured a staged pressure module containing the stripping chamber.

Now, in the latest office action, the Examiner acknowledged Applicant's arguments as persuasive, but again rejected the pending claims as obvious, this time combining the Komino patent with U.S. patent no. 5,672,239 to DeOrnellas ("the DeOrnellas patent"), in combination with a number of other references. These claim rejections are traversed as follows.

As acknowledged by the Examiner, the first, high pressure module of the Komino patent is not staged, and does not include a stripping chamber evacuable to near vacuum conditions. Specifically, the first module of the Komino patent operates only at atmospheric pressure or higher. (Emphasis added, col. 6, lines 36-42)

In an effort to provide some teaching regarding a staged module including a stripping chamber, the Examiner has now combined the Komino patent with the DeOrnellas patent. However, the Examiner is reminded that in order to combine reference teachings to provide a basis for an obviousness rejection:

there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.  
(Emphasis added; MPEP 2143)

Moreover, such teaching or suggestion to make the claimed combination must be found in the prior art, not based upon applicant's disclosure. See In re Vaeck, 947 F.2d 488 (Fed. Cir. 1991).

Here, there is absolutely no motivation to combine the DeOrnellas patent with the Komino patent. Specifically, the DeOrnellas patent describes only a tool used for removing material, for example by plasma etching or stripping, or by wet etching. col. 2, lines 9-16). The DeOrnellas patent contains no teaching, or even suggestion, that a tool incorporating the stripping chamber could be also utilized in any kind of an additive process.

The Examiner may argue the presence of a motivation to combine based upon the fact that both the DeOrnellas patent and the Komino patent utilize a stripping chamber. However, the Komino patent completely fails to recognize or articulate any possible advantage conferred by positioning a stripping chamber within a separate, staged, high pressure module. Similarly, the DeOrnellas patent is concerned exclusively with a tool designed to strip, etch, or otherwise remove material from a wafer. The DeOrnellas patent makes no mention of including additive processes such as chemical vapor deposition (CVD), to the tool.

The Examiner has combined the Komino and DeOrnellas patents with a number of other patents, in order to provide teaching regarding other specific cluster tool elements recited in the claims. Specifically, the Examiner has also cited U.S. patent no. 5,858,108 to Hwang ("the Hwang patent"), U.S. patent no. 6,214,620 to Kim ("the Kim patent"), U.S. patent no. 5,587,038 to Cecchi et al. ("the Cecchi patent") and Japanese P 11-087467A and U.S. patent no. 6,318,945 to Hofmeister ("the Hofmeister patent"). However, none of these references teach or even suggest a cluster tool including a staged atmosphere first module including an evacuable stripping chamber, as is now recited in the independent claims.

In light of the above remarks, and specifically because the references relied upon by the Examiner fails to provide any motivation for their combination, it is respectfully suggested that the pending obviousness rejection of the independent claims have now been overcome. The pending claims are now in condition for allowance, and early action by the Examiner to this effect is urged.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,



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